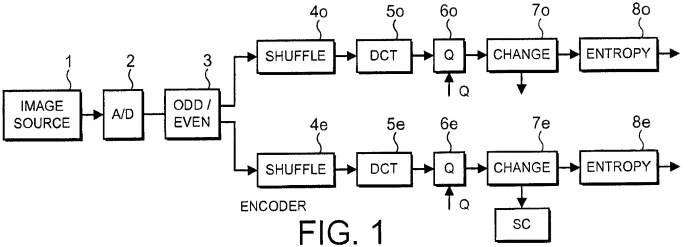

1
2
3
4o
5o
6o
7o
8o
IMAGE SOURCE
A/D
ODD / EVEN
SHUFFLE
DCT
Q
CHANGE
ENTROPY
Q
4e
5e
6e
7e
8e
SHUFFLE
DCT
Q
CHANGE
ENTROPY
Q
SC
ENCODER

FIG. 1

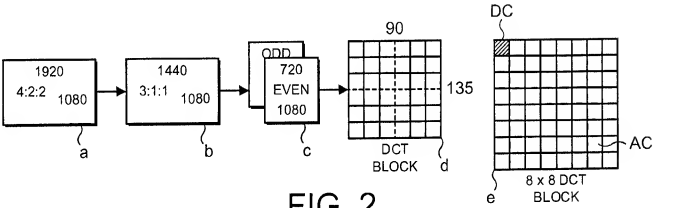

1920
4:2:2
1080
a
1440
3:1:1
1080
b
ODD
720
EVEN
1080
c
90
135
DCT BLOCK
d
DC
AC
8 x 8 DCT BLOCK
e

FIG. 2

FIG. 3A

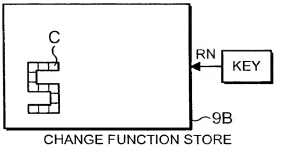


FIG. 3B

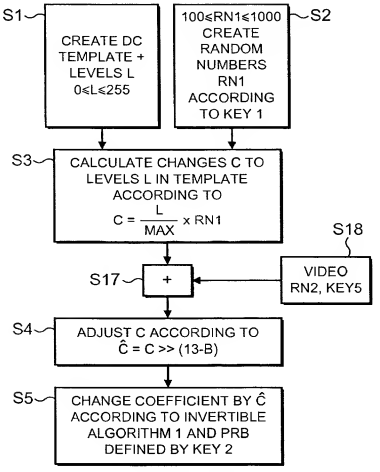


FIG. 4

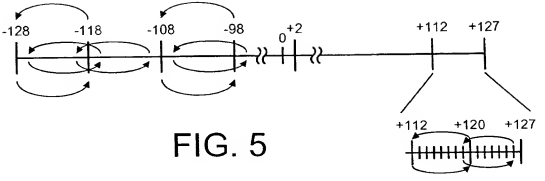

-128
-118
-108
-98
0
+2
+112
+127
+112
+120
+127

FIG. 5

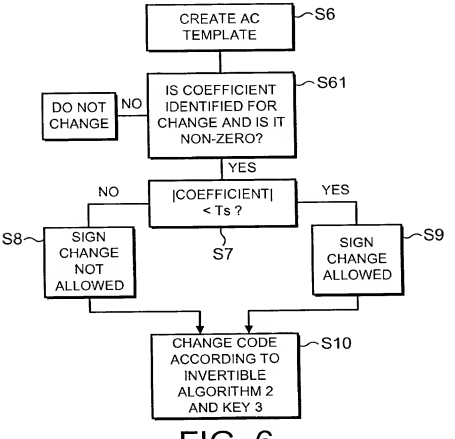

CREATE AC TEMPLATE
S6
IS COEFFICIENT IDENTIFIED FOR CHANGE AND IS IT NON-ZERO?
S61
NO
DO NOT CHANGE
YES
|COEFFICIENT| < Ts ?
NO
YES
S8
SIGN CHANGE NOT ALLOWED
S7
SIGN CHANGE ALLOWED
S9
CHANGE CODE ACCORDING TO INVERTIBLE ALGORITHM 2 AND KEY 3
S10

FIG. 6

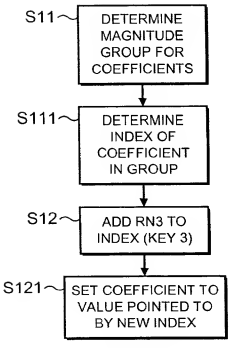


FIG. 7

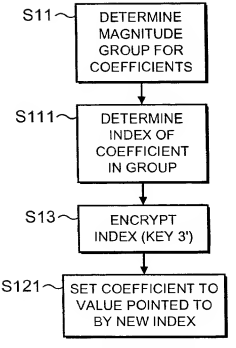


FIG. 8

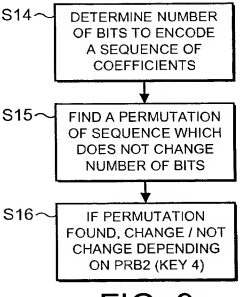


FIG. 9

1005021 • 0505001

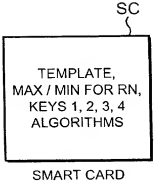


FIG. 10

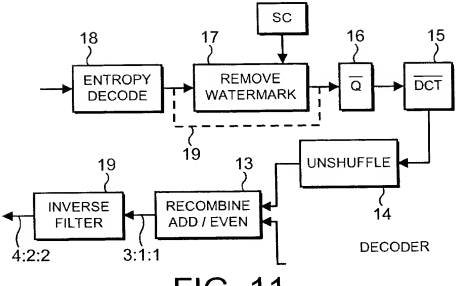


FIG. 11

1000650 • 1205021

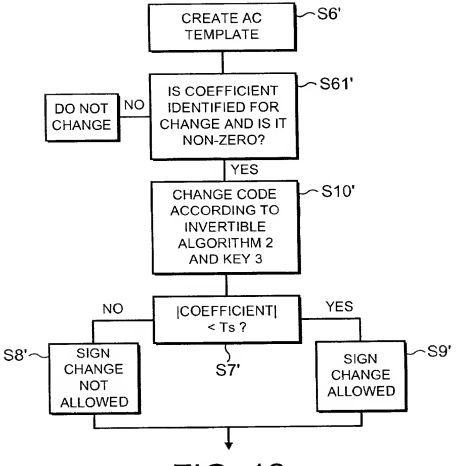
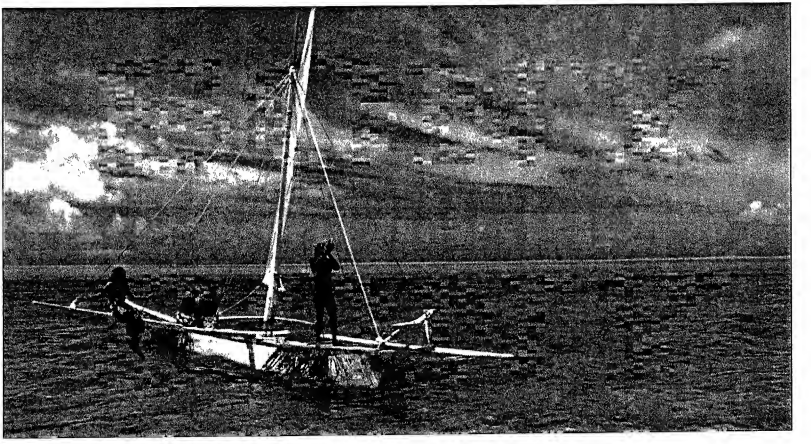

CREATE AC TEMPLATE
S6'
IS COEFFICIENT IDENTIFIED FOR CHANGE AND IS IT NON-ZERO?
S61'
NO
DO NOT CHANGE
YES
CHANGE CODE ACCORDING TO INVERTIBLE ALGORITHM 2 AND KEY 3
S10'
|COEFFICIENT| < Ts ?
NO
YES
S8'
SIGN CHANGE NOT ALLOWED
S7'
SIGN CHANGE ALLOWED
S9'

FIG. 12



EXAMPLE WATERMARKED IMAGE

FIG. 13

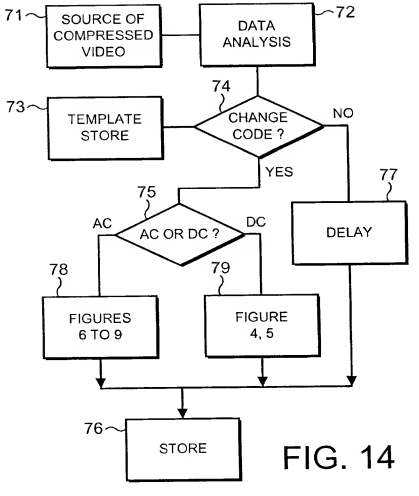


FIG. 14

WO 2004/025521 PCT/US2003/028501